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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/392,208	09/08/1999	WILLIAM CLAYTON SCOFIELD	OXMO-24.721	9767

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EXAMINER

BRINEY III, WALTER F

ART UNIT PAPER NUMBER

2646

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/392,208

Applicant(s)

SCOFIELD ET AL.

Examiner

Walter F. Briney III

Art Unit

2646

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15, 17-33, 35-45, 47, 49-54 and 56-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15, 17-33, 35-45, 47, 49-54 and 56-60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 31 August 2005 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claims 15, 21, 27-30, 32, 33, 39, 47, 51, 54, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu (US Patent 5,524,053) in view of Gehring (US Patent 5,521,981).**

Claim 15 is limited to a *method for real-time virtual positioning of a sound source in three-dimensional space as perceived during playback*. Iwamatsu discloses a sound field control device, which decodes a Dolby surround-sound signal and subsequently mixes the decoded signal into both a left and right output signal. See Abstract, figure 6, and column 6, lines 42-59. Clearly, the surround-sound is not binauralized, in the sense

that it is not processed and mixed in such a way as to simulate natural human hearing; the signals are instead physically placed around a user. The left and right output signals provided to speakers (84) and (86), respectively, are generated by a process that simulates the aforementioned natural human hearing by placing each decoded signal in some part of an *azimuthal plane*. However, it is clear from the figures, that the speakers (84) and (86) are mounted within a television or other image reproduction screen. Thus, the *output signals* are not played *through a localized speaker headset*.

The examiner takes Official Notice of the fact that headsets with both a left and right speaker was well known at the time of the invention. Headsets are recognized to provide a more personal listening experience. They block out noise from the outside world, and also serve to contain sounds, such that a person in the same room as the listener would not be disturbed. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a headset as the output device instead of the loudspeakers mounted within the video reproduction device disclosed by Iwamatsu for the purpose of containing the auditory environment to the user, such that another person in the same room would not be disturbed.

Returning to Iwamatsu, it is seen in figure 6, that a plurality of locations dispersed over the azimuthal plane relative to the listener are generated, namely: front-left, front-right, rear-left, and rear-right. These locations are digitally generated and approximated by the reflected sound generators (142) and (154). In the end, all these signals are mixed together (104) and (106) to form the left and right output. It is clear, however, that none of these positions correspond to elevation information (i.e. *repositioning select*

ones of the virtual locations to apparent positions above and below the azimuthal plane).

The prior art admitted by Gehring teaches a three-dimensional sound processor, which operates in real-time, such as the sound processor of Iwamatsu. The difference is that the processor taught by the prior art uses an HRTF, which is specifically designed for reproducing spatialized signals with a headset. See column 1, lines 30-40 and column 1, line 63 to column-2, line 13. The HRTF is then responsible for translating its input signal into a plurality of localized sources within a three-dimensional plane as seen in figure 1. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the reflected sound generators of Iwamatsu with the processors taught by the prior art admitted by Gehring for the purpose of applying an HRTF to the signal input, which is three-dimensional and which provides better spatialization for headset reproduction because it at least compensates for in-the-head noises.

Claim 33 is essentially the same as claim 32, as covered by Iwamatsu in view of Gehring, with the further limitations of *inputting a stereo audio signal from a video program prerecorded to include surround sound audio and decoding the surround sound audio to provide a plurality of surround sound signals*. However, these limitations are clearly supported by Iwamatsu; in particular, Iwamatsu describes in connection with figure 6, a Dolby surround-sound decoder (130), which generates audio from either a laserdisc or videotape. See column 6, lines 42-54. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claims 47 and 54 are essentially the same as claims 15 and 33, respectively, and are rejected for the same reasons.

Claim 21 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. Iwamatsu discloses decoding audio from either a laser disc or videotape, and the processing of the decoded audio to binaural represents *associating a video image with the non-binauralized input sound signal*. See column 6, lines 51-55. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claims 39, 51 and 58 are essentially the same as claim 21, and are rejected for the same reasons.

Claim 27 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear upon inspection of figure 6 of Iwamatsu that the synthesis circuit (136) generates the input for the sound generator (142). The input is a summation of the L, C, and R signals, and is thus a *monaural sound signal*. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 28 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear upon inspection of figure 6 of Iwamatsu that the Dolby decoder (130) generates stereo outputs, which are used as input to the sound generator (142) (*i.e. wherein the non-binauralized input sound signal is a stereo sound signal*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 29 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear upon inspection of figure 6 of Iwamatsu that the Dolby decoder (130) generates surround-sound outputs, which are used as input to the sound

generator (142) (i.e. *wherein the non-binauralized input sound signal is a surround sound signal*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 30 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. Surround-sound can be considered binaural in the sense that it positions sounds with respect to the listener, i.e. left, right, center, and surround signals (*wherein the input sound signal is a binaural sound signal*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 32 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear from reviewing each cited reference, that there is no mention of tracking the user's head movements, such that the sounds recreated in the headsets are produced based only on the HRTF functions and the original input signals (i.e. *wherein the perceived virtual locations of the sound signals do not vary with movement of the listener or of the listener's head in the azimuthal plane at the listening location*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

2. Claims 31 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu in view of Gehring and further in view of Begault (US Patent 5,173,944).

Claim 31 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. Because an HRTF as taught by Gehring is applied to the input surround-sound signal the process following the elements within block (28) of Iwamatsu, figure 6 are unknown. In addition, the real-time digital signal processing components suggested by Gehring are not complete in their disclosure. Therefore, Iwamatsu in view of Gehring

make obvious all limitations of the claim with the exception of *changing attributes of the signals representing the non-binauralized input sound signals, the attributes selected from the group including intensity, phase, and signal delay.*

In order to resolve the aforementioned deficiencies, attention is drawn to Begault. In particular, Begault teaches a real-time processor that converts a single input channel into two binaural channels. See figure 2. Specified amounts of *delay*, gain (i.e. *intensity*), and variable transfer functions are applied. It would have been obvious to one of ordinary skill in the art to implement the digital signal processor as taught by Begault because neither Iwamatsu nor Gehring disclose the details of an HRTF-capable processor, which is absolutely necessary for them to function together.

Claim 45 is essentially the same as claim 31, and is rejected for the same reasons.

3. **Claims 18-20, 36-38, 50, and 57** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu in view of Gehring and further in view of Görike (US Patent 4,158,753).

Claim 18 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. The rejection of claim 1 relied upon the well-known fact that headsets are a reasonable alternative to loudspeakers for reproducing sounds. However, this basic idea does not suggest any of the structure of the headset. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim with the exception of *supporting the left and right loudspeakers proximately in the plane of the zygomatic arch of the listener in rearward facing relationship with respect to the listener's head.*

Görike teaches a headphone of circumaural design. See Abstract and figure 4. The headphone taught by Görike positions each speaker in a forward section of the ear cup, so that the produced sounds are received from the front, preserving the natural ear resonance (i.e. *proximately in the plane of the zygomatic arch...in rearward facing relationship...to the listener's head*). See column 4, lines 14-21. It would have been obvious to one of ordinary skill in the art to use the particular headset as taught by Görike for the purpose of preserving the natural ear resonance during stereophonic reproduction.

Claim 19 is limited to *the method of claim 18*, as covered by Iwamatsu in view of Görike. As is clearly seen in figure 4 of Görike, the loudspeakers themselves are removed from the ear, inherently preserving the ear's *conch* resonance. Therefore, Iwamatsu in view of Görike makes obvious all limitations of the claim.

Claim 20 is limited to *the method of claim 18*, as covered by Iwamatsu in view of Görike. As indicated by Görike, the speakers themselves are removed from the ears, see figure 4, and are so positioned to defeat the effect of in-the-head localization and preserve the natural ear resonance (i.e. *such that the natural left-right and right-left separation of signals by the listener's head is maintained*). See column 3, lines 1-3 and column 4, lines 14-21. Therefore, Iwamatsu in view of Görike makes obvious all limitations of the claim.

Claims 36-38 are essentially the same as claims 18-20, respectively, and are rejected for the same reasons.

Claims 50 and 57 are essentially the same as claim 18, and are rejected for the same reasons.

4. **Claims 17, 22-26, 35, 40-44, 49, 52, 53, 56, 59, and 60** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu in view of Gehring and further in view of Miyamori et al. (US Patent 5,537,165).

Claim 22 is limited to *the method of claim 21*, as covered by Iwamatsu in view of Gehring. Iwamatsu discloses converting a plurality of surround-sound channels into a two-channel stereo output. See Abstract. In the rejection of claim 1, it was shown that it would have been obvious to reproduce the two-channel stereo output using a pair of headphones instead of the loudspeakers used by Iwamatsu. However, this combination results in there being no *external loudspeaker*.

Because Iwamatsu is trying to reproduce stored audio that simulates a theatrical presentation, it is reasonable to compare the setup depicted in figure 6, with a normal auditorium setup. To this end, Miyamori teaches a typical auditorium style speaker setup. While the surround-sound system of Miyamori is adequate, it does not include a subwoofer component. Miyamori teaches that the subwoofer (103) effectively outputs the sound felt as vibrations, rather than the low-range sound, such as the sound of explosion, and may be effectively employed for a scene of explosion and so forth. See column 7, lines 41-46. In addition, it is clear from figure 4 of Miyamori, that the subwoofer is directed toward the auditorium, and positioned in the line of sight from the central portion of the video screen. In addition, figure 3 of Miyamori illustrates the electronic decoding elements that are needed to further enable the system of Iwamatsu

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to reproduce such low sounds. In particular, an extra SW channel is needed, as well as a data selector (23b), which receives both the SW channel and a mixture of an AL and AR channel in case of data corruption on the movie medium. See Abstract and column 6, lines 22-39. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a subwoofer as taught by Miyamori to enable the reproduction of explosions and other tactile vibrations, which clearly cannot be reproduced by headphones alone, in addition, it would have been obvious to include the decoding means as taught by Miyamori including the subwoofer synthesizer for mitigating effects of corrupted data.

Claim 23 is limited to *the method of claim 22*, as covered by Iwamatsu in view of Gehring and further in view of Miyamori. As indicated in the rejection of claim 21, Miyamori teaches mixing portions of the decoded and non-binauralized signal to create a pseudo subwoofer channel, capable of being used in place of the subwoofer channel in the event of data corruption (*i.e. wherein the step of reproducing comprises the steps of: selecting portions of each channel of the non-binauralized input sound signal; blending the selected portions according to a predetermined mixing plan to generate a composite sound signal; and coupling the composite sound signal to the external loudspeaker*). See column 6, lines 22-39. Therefore, Iwamatsu in view of Gehring and further in view of Miyamori makes obvious all limitations of the claim.

Claim 17 is essentially the same as claim 23, and is rejected for the same reasons.

Claim 24 is limited to *the method of claim 22*, as covered by Iwamatsu in view of Gehring and further in view of Miyamori. It is inherent that the output of the subwoofer will contain voice energy, as it is a composite of both left and right channels. Even though the channels were low-pass filtered, residual voice will remain (i.e. *wherein the portion of the non-binauralized input sound signal reproduced by the external loudspeaker comprises voice sounds*). See column 6, lines 33-39. Therefore, Iwamatsu in view of Gehring and further in view of Miyamori makes obvious all limitations of the claim.

Claims 25 and 26 are limited to *the method of claim 22*, as covered by Iwamatsu in view of Gehring and further in view of Miyamori. As shown in the rejection of claim 24, the pseudo subwoofer channel is composed of the left and right audio channel, both of which are low-pass filtered (i.e. *wherein the select portion of the audible frequency spectrum of the non-binauralized input sound signal includes low-frequency tones*). Therefore, Iwamatsu in view of Gehring and further in view of Miyamori makes obvious all limitations of the claim).

Claims 35 and 40-44 are essentially the same as claims 17 and 22-26, respectively, and are rejected for the same reasons.

Claims 49 and 56 are essentially the same as claim 17, and are rejected for the same reasons.

Claims 52 and 59 are essentially the same as claim 22, and are rejected for the same reasons.

Claims 53 and 60 are essentially the same as claim 23, and are rejected for the same reasons.

Response to Arguments

Applicant's arguments filed 31 August 2005 have been fully considered but they are not persuasive.

With respect to claim 15, the applicant alleges on pages 12 and 13 of the current response that neither Iwamatsu nor Gehring describe repositioning selected ones of the plurality of virtual locations; the examiner respectfully disagrees. As a first matter, the previous comments made by the examiner in the Final Rejection mailed 14 June 2005 should be clarified. In particular, the examiner stated on page 12, line 21, through page 13, line 2, that Gehring does not teach how to select virtual locations for repositioning. In contrast to the applicant's allegation on page 12, lines 23-25, the above statement does not indicate that Gehring fails to teach repositioning selected ones of virtual locations, per se. Instead, the examiner's comments were meant to illustrate that while Gehring doesn't teach the mechanics of how to select virtual positions for repositioning, the claims merely recite the presence of "select ones" without reciting how particular virtual locations are chosen to become "select ones." Particularly in operation, it was noted that the HRTF system as taught by Gehring will place a sound somewhere in a 3D sphere as seen in figure 1 of Gehring based on the sound's HRTF. In this way, at least some (if not all) sounds will be repositioned.

With further respect to claim 15, the applicant alleges on page 13 of the current response that Gehring does not discuss repositioning individual ones of a plurality of virtual locations; the examiner respectfully disagrees. In particular, Gehring clearly illustrates in column 2, lines 15-25, that each sound requires about 10 MIPS. In addition, Gehring illustrates that multiple channels can be reproduced, e.g. 8 objects in a video game and 32 MIDI instruments in a musical composition. Each channel/object/instrument requires its own HRTF and convolution. Further note, each convolution including a change in elevation (as determined by an HRTF) corresponds to a repositioning of "select ones."

In summary, the previous remarks by the examiner merely indicated that the process used for defining each HRTF for each sound source is unknown, however, Gehring teaches the use of the HRTF's. And since the claim essentially recites only the use of the known HRTF's, it is submitted that Gehring teaches the limitations in question. Furthermore, Gehring applies an HRTF to each sound source in order to reposition it. Those sounds comprising an HRTF that happens to reposition the sound above or below the azimuth corresponds to said "select ones." Therefore, as all of the applicant's allegations have been shown to be either moot or unpersuasive, the rejection of claim 15 is maintained.

With respect to all other claims, the applicant alleges that these claims are allowable over the cited prior art for essentially the same reasons as claim 15 to which the examiner respectfully disagrees for the same reasons apropos claim 15.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter F. Briney III whose telephone number is 571-272-7513. The examiner can normally be reached on M-F 8am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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SENIOR PATENT EXAMINER